A COMPARATIVE INVESTIGATION OF MOTIVATION OF DEPRIVED YOUTH USING PROGRAMMED INSTRUCTION

by

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ABSTRACT

The purpose of this investigation was to determine whether or not the manner of payment of money as an extrinsic reward would affect motivation of young men from deprived environments to improve their ability to read. Sixty-six students were tested. All were between the ages of sixteen and twenty-two, were from deprived environments, and, further, had been incarcerated in a state correctional institution. Study materials consisted of intrinsically programmed lessons on three subjects: "Rules of the Road," "Job Descriptions," and "The Broadcaster."

Motivation directly related to achievement was provided by paying one group in proportion to the number of correct answers students gave on pre- and post-tests. Another group was paid a fixed fee for participating in the experiment. Study materials were presented on three types of teaching machines, each including spoken information accompanying the written text.

There was no observable difference in learning between the two motivational groups. One set of study material, however, "Job Descriptions," showed a consistent (but not statistically significant) increase in learning over the other two subjects.

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CHAPTER I

THE PROBLEM

The current "crisis in education" and the War on Poverty have made it abundantly clear that children reared in ghetto areas and in deprived environments have little motivation to take advantage of educational opportunities. Many attempts have been made to stimulate educational motivation of such youth by offering rewards, and it has been the purpose of this study to test one of these plans.

The Statement of the Problem

The problem in this study was to determine, using programmed instruction, whether or not monetary payments linked to academic achievement could serve as incentive to encourage youth from deprived environments to improve their ability to read.

Importance of the Study

There has been a growing recognition that poverty and social degradation are directly related to an individual's lack of education.[1] Federal, state, and local governments are engaged in efforts to strike at the roots of these results of chronic unemployment through education. Numerous campaigns have been under way to encourage under-privileged youth to remain in school or return to school after dropping out, using a variety of means to reward scholastic achievement. Most of these methods have been extrinsic to learning, such as providing warm lunches, allowing students who complete certain studies with a specified proficiency to use a social hall for a length of time, and paying students while they learn specific trades requiring a trained skill.

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[1] Richard I. Miller (ed.), Catalyst for Change: A National Study of ESEA Title III (PACE), Report to Subcommittee, 90th Congress, 1st Session, on P. L. 89-10 (Washington: Government Printing Office, 1967), 3-4.

The null hypothesis of this research implied that if a student could visualize a practical application of studies to his interests outside of school, his interest would serve to maintain motivation without external reward. It was also expected that the study would reveal significant relationships between the methods and subjects used as vehicles in teaching basic knowledge and the motivation of students to learn.

Programmed instruction was used as a tool or medium to assure that stimuli provided to different groups of students would be identical. This was expected to demonstrate expanded usefulness of programmed instruction, beyond its use as an effective teaching device.

Definitions of Terms

Certain terms need to be specially defined for the purpose of this research.

Extrinsic motivation. Extrinsic motivation is understood to be stimulation of interest that is produced by a reward which is not part of the information taught or included in the programmed instruction presented.

Fixed incentive. A fixed incentive is a fee which does not change or depend on achievement. As a fixed incentive, students in one group were paid five dollars for participation in the study, regardless of achievement.

Instructional media. Instructional media are the means by which learning is presented to the students. In this study, they consisted of courses presented in branching (intrinsic) programmed format, on paper and microfilm, displayed by appropriate devices and synchronized with a spoken voice on tape or film recordings. Material was presented by three modes or types of teaching machines.

Intrinsic motivation. Intrinsic motivation is the stimulation of interest produced by the content and format of presentation of the instructional material itself.

Motivation. Motivation is defined here as the process which incites, or gives impetus to, action and maintains and directs that action to complete the achievement of goals set forth.

Variable incentive. A variable incentive is a reward which changes at a set rate depending on achievement. As a variable incentive, students in one group were paid five cents for each correct response they gave on pre- and post-tests taken during the project. For this group, reward was directly related to achievement.

Assumptions

The investigator assumed in the study that for learning to take place, the student had to be motivated to a change of behavior by a satisfying reward. It was assumed that the degree to which the reward was satisfying and perceived as related to achievement would affect the effort the student was willing to expend to earn the reward and that this effort would result in achievement which could be measured by the gain scores on the tests.

The investigator also assumed that the subject matter taught would be of practical interest to the students and that they would enjoy an opportunity to assemble equipment with their hands while following instructions in the lessons.

Hypothesis

The null hypothesis of the problem held that there would be no significant difference in gain in reading ability whether the students were paid a fixed incentive for participating in the study or at the variable-incentive rate which depended on achievement.

CHAPTER II

REVIEW OF RELATED LITERATURE

Many current practices in public school teaching owe their origin to John Dewey and The Laboratory School at the University of Chicago.[1] He demonstrated that children learn faster and more thoroughly the subjects in which they are actively involved. That is, they learn by doing, by acting out what they are learning. Thus, children learn best the activities they like and are familiar with.

From this premise has arisen the teacher's task of finding out what each child likes to do, and the misconception that a teacher should devote much of his time to letting children's activities direct the class. What Dewey meant was that if the teacher will relate study materials to students' interests and experiences, even the most difficult and boring subject can be stimulating. This approach indicates that it is almost useless to try to teach a child from a deprived urban slum to read if study materials are centered around middle-class suburban (or rural) life. Yet, such materials are still used in some cities. Dewey's emphasis was on leading children to see learning experiences as series of pleasant tasks and opportunities for challenge and advancement.[2] The study materials chosen for this instruction were selected because they were considered interesting to students from an urban environment.

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[1] Martin S. Dworkin (ed.), Dewey on Education (selections; New York: Teachers College, Columbia University, 1959).

With an improved understanding of this type of guidance, practices in public schools are now increasingly taking advantage of children's own motivation. Current literature indicates an increased understanding of the need to involve each student actively in the learning process. A great deal of effort is devoted to the problem of identifying the types of activities and rewards which provide positive motivation. This study has examined in detail one possible method of stimulating motivation toward academic achievement.

Literature on Public School Practices

A number of recent writers have related motivation to school facilities and group interaction.[3] Sources of motivation in a classroom include materials, people, and group activities. Writers advocate the use of attractive displays, field trips, dramatics, demonstrations, and group planning.

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[2] Ibid.

[3] "Motivation," National Education Association Journal, XLVIII (January, 1952), 12.

Self-motivation, like self-discipline, is the ultimate goal of external motivation. "When immediate needs are recognized and satisfied, intrinsic drives are reinforced and surer action toward remote goals is motivated."[4]

Some writers advocate that art teachers motivate students by challenging them to expand their visual concepts and change their viewpoints.[5,6] They emphasize the use of attractive displays and freedom of student interpretation. These writers all agree that feedback, or reinforcement, is essential to positive motivation to achieve. This is true even if feedback is in the form of criticism. The student must be made aware of inadequate performance, as well as be praised for good performance. Programmed instruction provides immediate feedback for each step of learning, so the student can quickly know if he has learned adequately. The programmed instruction used in this study provided criticism when the student had not learned steps properly, and it reinforced correct answers; it, therefore, was expected to motivate students intrinsically, i.e., by the nature of its own form.

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[4] Ibid.

[5] Marilyn Pappas, "Motivation, New Ways of Seeing," School Arts, LXIII (September, 1963), 8.

[6] Mary McMullan, "The Key to Action," School Arts, LXIII (March, 1964), 5.

Almost all writers refer to individual differences, and one calls attention to motivational differences related to sex.[7] He cites several situations in which boys and girls scored equally well in standardized tests, yet in tests administered after specific training, girls invariably scored higher than boys. This, he claims, is because of girls' natural superiority in language skills and the emphasis of education on verbalization. Boys, however, are superior in analytical skills and transfer training; this is related to boys' greater aggressiveness, curiosity, and flexibility. Thus, if classroom emphasis is on relationships rather than facts, boys will show higher achievement than girls. He also indicates that students will be more likely to seek knowledge in an atmosphere of permissiveness, where a small amount of "cognitive novelty" arouses exploratory behavior. That is, if a child encounters a situation he does not understand, he should have freedom to allow his curiosity to seek an explanation. Too much novelty is overwhelming, and too little does not excite curiosity. Thus, Waetjen's emphasis is on intrinsic factors of motivation to be applied in the classroom. The null hypothesis of the study described below held that extrinsic motivation has less influence on learning than intrinsic motivation.

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[7] Walter B. Waetjen, "Learning and Motivation: Implications for the Teaching of Science," The Science Teacher, XXXII (May, 1965), 22.

In attempting to set up a model school in a deprived section of Washington, D. C., experiments in extrinsic motivation have been tried at Cardozo High School.[8] Whenever a student attained a prescribed achievement in the classroom, he was entitled to spend a certain length of time in a recreation room, where he could listen to his favorite "pop" records or buy soft drinks with credits earned in classes. In the study which will be described below, students' accounts were credited with money which they could use at the canteen at the institution. For some, the amount depended on achievement; for others, it was a gratuity for participating.

More recently, several other experiments have been conducted using extrinsic rewards to stimulate academic achievement. In one, ten high school boys who were on the verge of dropping out were paid five dollars for getting grades of A and B.[9] Results were considered successful; all improved their grades and one earned honor grades. In addition to money, other rewards were also given. One boy received books about weather, in which he was interested, and others got weekend skiing trips or passes to football games. One boy remarked, after the experiment was over, "Once you get the habit, it's easier to study. It's not really so much the reward, it's having someone show an interest."[10] This remark may point up a key to why students improved in learning regardless of the mode of motivation tried in the experiment described below. In the larger sample tried in the latter experiment, the difference in gain scores achieved by the two groups did not indicate that money related to achievement would stimulate more learning than pay for participation. But there was strong indication that certain study materials produced much better learning than did others.

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[8] Feature article, "Outlook," The Washington Post, November 28, 1965, E-2.

[9] "Golden Grades," Newsweek, LXVII (April 4, 1966), 62.

Another experiment in providing extrinsic motivation for learning is described as an eighteen month study of exceptional (problem) children between the ages of just under three years to just under five years.[11] These children were given tokens for learning good group behavior and deportment, for learning to speak in more than monosyllabic expressions, and for learning to read. To initiate appreciation of them, tokens were at first accompanied by pieces of candy. Childred used tokens to pay for movies in class, outdoor walks, and other activities they enjoyed. Those who did not have enough tokens were excluded from the activities. When tokens were removed, and rewarding activities given without regard to behavior, achievement declined to almost the level it had before the tokens were first given. Also, when reinforcers were not connected to work in the classroom, they did not sustain the high level of attention and study that were gained when they were used as specific rewards. After several months, however, the desired behavior had been sufficiently reinforced that it was retained in the children's homes. The number of children had been limited to four or five in each group. They had been hyperaggressive, shy, and autistic.

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[10] Ibid.

[11] Robert L. Hamblin, et al., "Changing the Game from 'Get the Teacher' to 'Learn'," Trans-Action, VI (January, 1969), 20-31.

The foregoing study, with such outstanding results, is really different from the one described below, in that the students were small boys and girls, rather than young men who had many years experience with little reinforcement of socially acceptable behavior. It should also be noted that tokens were not as effective with normal children as with the exceptional ones, and that the confined youth described below were specifically required to be "of normal intelligence." As will be shown, (on page 30 herein), the larger sample of normal youth did not respond any differently to the variable incentive linked to achievement than to the fixed incentive.

One theory regarding payment of monetary rewards to help solve the problems of ghetto dropouts holds that middle- and upper-class students receive adequate reinforcement for academic success from their social environment, but lower-class students do not.[12] In fact, intellectual curiosity among the latter is sometimes negatively sanctioned. Therefore, money or tokens could provide such students with the needed reinforcement to foster constructive attitudes. Such rewards are comparable to fellowships, grants, or tax credits allowed to maintain a student in an educational institution. In school, as in business, "Monetary considerations [could] serve not only as payment, but as incentives to competence."[13] The experiment to be described below (page 30) does not indicate that monetary rewards affect achievement. It may be that the fixed incentive was too large in proportion to the variable incentive to produce a noticeable difference in gain. The simple opportunity to participate in an experiment showed the men that someone took an interest in them, and this perception may have been reflected in the men's interest in the study materials. (The duration of the experiment may have been so short that the Hawthorne Effect predominated over rewards.) Finally, it may be that students were genuinely interested in the study materials.

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[12] Stewart Cohen, "The Ghetto Dropout: Analysis and Partial Solution," The Clearing House, XLIV (October, 1969), 118-22.

[13] Ibid, 120.

Behavioral sciences devoted to education are becoming increasingly aware of a general failure to identify unique individual differences which enable some students to learn at a satisfactory level in the present class-structured schools, while others fail to learn or are bored. One attempt to overcome this inhibition to learning is the effort to develop non-graded or continuous-progress school systems. In one such system, students are given "Learning Activity Packages" which present major (single) concepts to be mastered.[14] When a student feels that he has reached a prescribed achievement, he consults his teacher in a one-to-one relationship about his next step. The rapid learner may be given enrichment material; slow students may be assigned to remedial studies. No one is embarrassed by exposure to his fellow students; each works at the pace that is best for him in each subject. Alternate modes of learning and content material offer students opportunities for decision-making. For example, if a student has difficulty in reading, he may choose to hear a recording of someone reading the study material, seeing a film on the subject, or reading similar concepts written at a simpler reading level. Individual studies are also interspersed with group discussions when a number of students have reached the same point in their studies. This teaching method is, obviously, directed at the use of intrinsic motivation to stimulate learning. The null hypothesis of the present study (page 5) implies that greater success may be gained by such an activity approach than by use of extrinsic rewards.

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[14] Learning Activity Packages, Appendix C to Final Report. (Model Secondary School for the Deaf - A Study of Instructional Methodologies. Silver Spring, Md.: Computer Applications Incorporated, Education and Training Division, 1968.)

Reports on Motivation with Programmed Instruction

Following in Dewey's footsteps was B. F. Skinner, of Harvard, who found that tests can be just as instructive as other activities in a classroom. And from this basic concept grew the idea of teaching by means of a series of questions, each with immediate reinforcement to let the student know that he had answered correctly. This knowledge of achievement and success would spur the student to increase learning further. It was important that learning steps be small enough so that the student could be fairly certain he was right before he looked at the answer. Skinner's method makes use of the student's motivation toward success ("achievement motivation") as a stimulus to learning. Thus, motivation is an intrinsic part of the learning process. Such programs are described as "linear" because all material is presented in a fixed sequence which all students must follow.

Recognizing that students can also learn from mistakes, Norman Crowder developed the branching, or "intrinsic," technique of programmed instruction, in which corrective information is given whenever the student has not learned correctly; students who have learned correctly do not need this information, but may proceed to new information.[15] Therefore, some students can progress very rapidly from one correct answer to the next, while others may need to study corrective material or work repetitive drills which would be included for everyone in a linear program. A student may move rapidly through part of a lesson which he understands well and get corrective information on parts he does not grasp so quickly. Branching programs were used in this study.

In a study of the effects of motivation on achievement with linear programmed instruction, Moore and Smith (1965) found significant interrelationships between difficulty of the program and the degree of a student's anxiety.[16] Their study is an attempt to evaluate the difficulty of a linear program in terms of how quickly the motivational effects of the novel format wear off. They found that if the program is too easy for students with high ability and low anxiety, (those with high expectancy of success), they soon become bored. Students having high ability coupled with high fear of failure are not so soon affected, and learn quite readily from a difficult program. A converse effect seems to hold for low achievers. A general finding was that with a linear program, completion of frames alone was not sufficient to sustain interest in learning. It would seem from Moore and Smith's study, then, that format, as an extrinsic motivator, is not as important a factor in learning as some other factors, such as cognitive novelty or logical organization. The contention of the null hypothesis of the present study (page 5) was that financial rewards related to scholastic achievement were not significant factors, either. The latter study investigated motivation with an intrinsic program involving both visible and audible sources of information and considered possible learning effects of anxiety created by a desire for monetary rewards.

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[15] Norman A. Crowder, "On the Differences Between Linear and Intrinsic Programming," Phi Delta Kappan, XLIV (March, 1963), 250-54.

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[16] J. William Moore and Wendell I. Smith, "Motivation in Automated Instruction," School Life, XLVI (November, 1963), 21, and J. William Moore, Wendell I. Smith, and Richard Teevan, Motivational Variables in Programmed Learning (Final Report: USOE, Title VII, Grant No. 7-48-0070-149.1. May, 1965), 40.

In a recent psychological consideration of the relationship of motivation to programmed instruction, strong criticism is made of the theory that motivation is extrinsic to learning.[17] This theory, it is argued, has led to simplistic, mechanical concepts and practices of learning and reinforcement, so that learning is measured and stimulated in accordance with observable behavior rather than by logical orders of knowledge. Observable behavior alone does not indicate whether or not learning is taking place. Under certain conditions, individual behavior may actually seek stimulation to which to respond. Logical organization of information can provide motivation to increase an acquisition of knowledge, such as to resolve "cognitive dissonance." That is, if experience is contradictory to previous conceptions, a condition exists which, by itself, stimulates learning. With proper logical organization, the knowledge presented can serve as a basis for intrinsic motivation. This theory of learning may help to explain some of the findings observed in the experiment described below. The variable incentive reward linked to achievement did not produce higher learning than the fixed incentive, but learning was considerably higher for one subject than for the other two.

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[17] Kenneth R. Stafford and Charles F. Combs, "Radical Reductionism: A Possible Source of Inadequacy in Autoinstructional Techniques," American Psychologist, XXII (August, 1967), 667.

Summary

The literature available on the subject of motivation as related to learning emphasizes the importance of rewards as stimuli to achievement. In public schools, most rewards are expressed as grades, and efforts to stimulate students have been directly related to study materials. Art work, posters, field trips, and other intrinsically related materials are frequently described. In a few experiments, token rewards have been given, which could be exchanged for privileges and participation in special activities. These seem to have been very successful in classes of exceptional (problem) children, when immediately related to behavior in the classroom. They serve to establish constructive habits, and after a while, can be withdrawn and replaced by social rewards. Individual lesson plans in non-graded school systems provide intrinsic motivation by allowing each student's own progress to stimulate him as he proceeds through a course.

Programmed instruction provides intrinsic motivation at each step of learning. A great deal of difficulty is encountered, however, in arranging the step size to be appropriate for all students taking a single program. Some students respond well to one program, while others require a different one. Criticism has been made of the behavioral approach to learning theory, holding that a logical arrangement of concepts, encouraging curiosity, is more important than the student's reward of knowing that he selected correct responses. Available literature on motivation with programmed instruction is confined to research with linear programs. No literature was found relating extrinsic motivation to intrinsic, or branching, programmed instruction.

CHAPTER III

METHOD OF RESEARCH IN THIS STUDY

The experimental method of research was used in this study, with selected inmates at the Maryland Correctional Institution at Hagerstown serving as subjects (students).

Types of Data

Data consisted of test scores on pre-tests and post-tests for each of two lessons in each of three courses. Starting time and completion time for each course were also recorded for each student.

Criteria for Admitting Data

Students selected were over sixteen years old and had not passed their twenty-second birthday at the start of the experiment. Their reading levels had been determined by the Institution at the time of each student's admission, using the *California Achievement Test*, and only those students whose grade level score fell between 4.0 and 5.5 were used in this experiment. No definite information was available from the Institution's school administration regarding the length of time between each student's admission and conduct of this experiment. The investigator was assured that "they haven't changed much." Groups of students learning by the three modes of instruction (teaching machines) were matched by averaging their grade levels, so that the mean-reading-level score for each group was as nearly as possible the same.

Description of Students

The students used in this experiment were young men between the ages of sixteen and twenty-two years who were serving sentences at Maryland Correctional Institution at Hagerstown. This is a medium security institution, housing criminal offenders who have been sentenced to confinement of one year or more, up to life imprisonment. The average sentence is about three years. Students used in the experiment were of normal intelligence, but unable to read above a grade level of 5.5 on the California Achievement Test when they were first admitted. Only one had completed twelfth grade, and one had not completed above fourth grade. Specifically excluded were individuals who were mentally retarded, psychotic, or suffering from brain damage. No distinction was made regarding race.

Students had in the past, generally, been unwilling or unable to learn in school. Only one had a reading ability equal to the highest school grade he had attended; he had completed only fourth grade and his reading level was 4.5. (He may have attended part of the fifth grade.) All had great difficulty with language, both in speaking and reading.

Because of their low achievement in school, they also had little work experience. Constant frustration had inhibited any self-motivation or drive they may have had as children. They generally had little ability to relate to people or activities which were not directly related to their personal experiences. They often expressed fear for their safety or loss of personal satisfaction. They did not have a wide range of interests beyond those necessary for social acceptance by their peers. As individuals, however, most of them seemed anxious to please the instructor who administered the program.

Methodology

The measure of learning used was the difference in test scores between post-tests and pre-tests administered immediately after and before students studied each lesson. The difference in test scores was termed the "gain score." Gain scores for the two modes of motivation were compared to see if the variable incentive rewards given to one group had greater effect on achievement than the fixed incentive fee given to the other group.

Students in the variable-incentive group were paid five cents for each correct response they gave to pre- and post-test questions. Students paid the fixed incentive were paid five dollars for participating in the project, regardless of achievement. The difference in number of correct responses was considered to be due to higher motivation stimulated by the mode of payment.

Data were compared statistically by means of a t-test to determine whether the differences in gain scores between the two modes of motivation were significant or not. Results were interpreted in terms of the relative effectiveness of the two incentives.

Detailed Statement of Methodology

Data collected. Two groups of thirty-three students were each given multiple-choice tests for understanding of words and meanings of sentences immediately before studying each lesson. Sample tests may be found in the Appendix.[1] These tests were designed specifically for this project, using a pilot study to determine difficulty of items in relation to a similar population. Students were again tested by means of equivalent, but not identical, tests immediately after studying each lesson. The difference in test scores was taken as the measure of learning. The mean reading-test score (as determined by the institution using the California Achievement Test) of students in each of the six groups were matched in grade level for each mode of presentation of the course material and motivational condition.

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[1] Branching programs and tests were both designed with three choices for each question, rather than four or five, because of the expected low ability of students to make fine discriminations.

To minimize motivational effects of communication between the two groups of students, the fixed incentive was given to students in the first group tested. It was expected that students would be less likely to talk about their success if they knew that all had received the same amount. The variable incentive of five cents per correct answer to test questions was paid to the second group of students. On the basis of a pilot study, it had been estimated that an average student would be able to answer approximately one hundred questions correctly. Therefore, students paid the variable incentive would earn the same amount as students paid the fixed incentive of five dollars for participation. Individuals in the second group who earned more than the average amount could be expected to boast to their fellow inmates, thereby affecting motivation of other students. The arrangement of payments used emphasized the relationship of payment to achievement, rather than any difference in amount received by the two groups. Actually, a surprisingly large number of students answered more than one hundred questions correctly.

Where data were obtained. The subjects for this experiment were volunteer students who were inmates at Maryland Correctional Institution at Hagerstown. Two sets of each kind of teaching machine for each of three modes of presentation were set up in a classroom in the school wing of the institution. (The school was operating with reduced activity during the summer months.) Inmates were not permitted to receive or carry cash, but rewards were payable to each student's account in the custodial records office. Students were free to draw upon these accounts for personal items they wished to buy from the commissary at the institution.

How data were obtained. Since this investigation was adjunctive to a study of the relative effectiveness of three modes of presentation of automated reading materials, the method of obtaining data was somewhat more involved than a simple randomized design. To improve reading and language skills, vocabulary development materials were presented to students in three contexts of interests and vocational subject matter: "Rules of the Road," "Job Descriptions," and "The Broadcaster," administered in that order. These study materials were thought to be of sufficient interest and to provide enough activity to motivate deprived youth to learn when stimulated by intrinsic content alone. The materials were presented by three types of teaching machines, each allowing the student to hear important information at the same time as he saw the written words. Two sets of each type of machine were available. There were two lessons on each subject of the study material and these were administered, in most cases, during the same morning or afternoon session. In a few instances, students were permitted to take a pre-test and study one lesson and take the post-test on it and pre-test on the second lesson in one session, and then study the second lesson and take the post-test on it during the following session. Once a student had started to study a lesson, he was expected to complete it and take the post-test on it during the same session.

Treatment of data. A controlled-selection design was used so that groups of students learning by each mode of presentation and motivation had nearly the same reading ability at the start of the project. Students were selected from a list of inmates whose California Achievement Test (grade level) reading scores were between 4.0 and 5.5. Reading test scores were averaged for each cell in the study so that all cells had students with nearly the same reading level. Data obtained from the two motivational modes were subjected to simple t-tests to determine whether results for any group were significantly different from those for other groups or not. Calculations were as follows:

Mean gain scores of the groups were computed by

$$M = \frac{\Sigma x_i}{n}$$

where x_i is the gain score of each student and n is the number of students in each group.

To test the significance of the deviation of the mean scores from those which would be obtained by chance, Fisher's t-test formula for the difference of means using small samples was used:[2]

$$t = \frac{M_1 - M_2}{\sqrt{\frac{\Sigma x_1^2 + \Sigma x_2^2}{n(n-1)}}}$$

The table of t-values indicates the maximum value of a computed t (from observed data) that will be obtained in any instance if only chance factors are operative. Therefore, if the computed t is greater than the value indicated by the table, for the proper number of degrees of freedom, factors other than chance are operating. If the obtained values are less, deviations of the mean in the data cannot be considered significant.

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[2] J. P. Guilford, Fundamental Statistics in Psychology and Education (New York: McGraw-Hill Book Company, Inc. 1950), 228.

CHAPTER IV

RESULTS OF THE INVESTIGATION

The difference in the number of correct answers given on post-tests and pre-tests for the six lessons were calculated for each student. These differences were then added to find each of the gain scores. Since all students answered all questions on all twelve tests, the number of questions involved does not affect the change in gain score as far as the two modes of incentive motivation are concerned. Test scores, arranged by type of teaching machine for each incentive condition, are shown in Tables I to VI.

Findings

Mean gain scores for all students taking all subjects showed an increase of 66.7 correct answers for students under the variable incentive condition and 65.2 correct answers for students under the fixed incentive. The computed value of t for thirty-two degrees of freedom (thirty-three students) is 0.256. A table of t-ratios significant at the 5 percent level indicates that with thirty degrees of freedom the t-value should be at least 2.042 to indicate that differences were significant. With thirty-five degrees of freedom, the required t-value is 2.030. The value for thirty-two degrees

TABLE I

TEST SCORES - VARIABLE INCENTIVE: TALKING SLIDES

		Rules of the Road			Job Descriptions			The Broadcaster		
Student	Lesson	Pre-test	Post-test	Gain	Pre-test	Post-test	Gain	Pre-test	Post-test	Gain
A	1	13	16	3	7	9	2	7	10	3
	2	8	9	1	8	13	5	5	12	7
B	1	11	16	5	4	10	6	4	9	5
	2	6	7	1	7	10	3	11	4	-7
C	1	12	11	-1	6	11	5	9	11	2
	2	9	10	1	8	13	5	6	11	5
D	1	12	16	4	7	13	6	9	14	5
	2	7	11	4	8	14	6	9	13	4
E	1	14	16	2	7	9	2	10	12	2
	2	8	11	3	5	13	8	7	13	6
F	1	11	17	6	10	13	3	8	12	4
	2	6	11	5	7	14	7	8	12	4
G	1	13	16	3	7	13	6	10	12	2
	2	7	11	4	10	13	3	6	11	5
H	1	13	15	2	7	13	6	8	10	2
	2	9	11	2	10	12	2	12	13	1
J	1	8	14	6	6	10	4	5	5	0
	2	10	10	0	4	12	8	4	8	4
K	1	10	15	5	9	12	3	11	12	1
	2	6	8	2	10	13	3	7	11	4
L	1	11	16	5	5	13	8	7	12	5
	2	5	10	3	10	14	4	11	14	3

TABLE II

TEST SCORES - VARIABLE INCENTIVE: TALKING AUTOTUTOR

		Rules of the Road			Job Descriptions			The Broadcaster		
Student	Lesson	Pre-test	Post-test	Gain	Pre-test	Post-test	Gain	Pre-test	Post-test	Gain
A	1	12	17	5	9	13	4	12	14	2
	2	8	10	2	9	12	3	8	13	5
B	1	10	15	5	8	8	0	7	11	4
	2	8	11	3	8	12	4	9	9	0
C	1	10	15	5	1	11	10	6	9	3
	2	6	9	3	11	13	2	10	11	1
D	1	8	15	7	9	13	4	8	11	3
	2	7	11	4	6	12	6	8	10	2
E	1	12	16	4	12	13	1	10	13	3
	2	9	11	2	9	14	5	10	12	2
F	1	10	14	4	5	11	6	7	11	4
	2	4	7	3	10	12	2	6	13	7
G	1	14	17	3	12	13	1	9	13	4
	2	10	11	1	11	13	2	9	14	5
H	1	13	16	3	11	13	2	11	14	3
	2	10	10	0	12	13	1	10	12	2
J	1	13	17	4	6	13	7	8	11	3
	2	11	11	0	6	13	7	8	12	4
K	1	10	16	6	8	13	5	11	10	-1
	2	8	10	2	8	13	5	7	10	3
L	1	11	16	5	10	13	3	10	11	1
	2	6	9	3	10	14	4	10	11	1

TABLE III

TEST SCORES - VARIABLE INCENTIVE: TALKING BOOK

		Rules of the Road			Job Descriptions			The Broadcaster		
Student	Lesson	Pre-test	Post-test	Gain	Pre-test	Post-test	Gain	Pre-test	Post-test	Gain
A	1	10	14	4	8	13	5	10	12	2
	2	9	10	1	9	14	5	6	10	4
B	1	9	16	7	7	12	5	7	11	4
	2	11	11	0	6	12	6	6	14	8
C	1	8	15	7	4	12	8	6	12	6
	2	8	10	2	8	14	6	4	9	5
D	1	8	14	6	9	12	3	5	11	6
	2	6	9	3	5	13	8	4	12	8
E	1	12	14	2	6	13	7	7	9	2
	2	7	8	1	11	13	2	10	10	0
F	1	13	17	4	6	12	6	5	8	3
	2	9	10	1	4	13	9	3	6	3
G	1	7	16	9	6	13	7	4	10	6
	2	5	10	5	5	13	8	8	11	3
H	1	11	14	3	5	13	8	8	13	5
	2	7	9	2	9	12	3	11	11	0
J	1	12	16	4	11	13	2	9	12	3
	2	8	10	2	7	12	5	9	14	5
K	1	10	14	4	4	12	8	4	8	4
	2	8	9	1	7	11	4	8	7	-1
L	1	8	14	6	5	9	4	6	10	4
	2	3	9	6	7	12	5	8	8	0

TABLE IV

TEST SCORES - FIXED INCENTIVE: TALKING SLIDES

		Rules of the Road			Job Descriptions			The Broadcaster		
Student	Lesson	Pre-test	Post-test	Gain	Pre-test	Post-test	Gain	Pre-test	Post-test	Gain
A	1	16	14	-2	8	12	4	8	8	0
	2	11	11	0	12	13	1	5	11	6
B	1	9	17	8	8	13	5	5	13	8
	2	6	8	2	6	14	8	7	11	4
C	1	12	13	1	6	12	6	6	9	3
	2	7	9	2	7	13	6	6	8	2
D	1	9	14	5	12	13	1	5	11	6
	2	6	9	3	7	13	6	9	10	1
E	1	11	16	5	8	13	5	9	12	3
	2	9	11	2	9	13	4	9	13	4
F	1	12	15	3	6	10	4	9	12	3
	2	9	11	2	8	11	3	9	12	3
G	1	9	16	7	9	11	2	9	12	3
	2	5	7	2	7	13	6	9	11	2
H	1	9	16	7	8	13	5	9	10	1
	2	9	11	2	8	14	6	10	10	0
J	1	9	10	1	1	11	10	2	4	2
	2	5	3	-2	9	6	-3	3	3	0
K	1	6	12	6	7	9	2	8	7	-1
	2	5	8	3	10	12	2	9	12	3
L	1	8	14	6	5	13	8	4	9	5
	2	4	6	2	4	11	7	6	11	5

TABLE V

TEST SCORES - FIXED INCENTIVE: TALKING AUTOTUTOR

Student	Lesson	Rules of the Road Pre-test	Rules of the Road Post-test	Rules of the Road Gain	Job Descriptions Pre-test	Job Descriptions Post-test	Job Descriptions Gain	The Broadcaster Pre-test	The Broadcaster Post-test	The Broadcaster Gain
A	1	12	12	0	9	9	0	5	10	5
	2	8	9	1	9	10	1	12	13	1
B	1	6	15	9	4	9	5	6	7	1
	2	7	10	3	6	11	5	8	9	1
C	1	13	16	3	5	12	7	7	12	5
	2	7	11	4	9	14	5	4	13	9
D	1	8	7	-1	5	6	1	7	8	1
	2	1	6	5	5	5	0	5	4	-1
E	1	12	14	2	6	12	6	6	14	8
	2	7	11	4	8	14	6	9	13	4
F	1	11	13	2	5	8	3	3	6	3
	2	6	8	2	7	10	3	9	9	0
G	1	11	15	4	6	12	6	8	9	1
	2	11	10	-1	5	14	9	6	12	6
H	1	7	14	7	4	8	4	8	6	-2
	2	7	5	-2	7	7	0	7	8	1
J	1	6	15	9	7	12	5	3	3	0
	2	4	8	4	9	10	1	7	11	4
K	1	9	17	8	6	12	6	8	12	4
	2	7	11	4	5	10	5	5	11	6
L	1	11	13	2	4	11	7	5	12	7
	2	7	11	4	6	13	7	8	12	4

TABLE VI

TEST SCORES - FIXED INCENTIVE: TALKING BOOK

		Rules of the Road			Job Descriptions			The Broadcaster		
Student	Lesson	Pre-test	Post-test	Gain	Pre-test	Post-test	Gain	Pre-test	Post-test	Gain
A	1	14	14	0	7	13	6	10	12	2
	2	9	11	2	10	13	3	9	13	4
B	1	12	16	4	7	13	6	9	11	2
	2	9	10	1	9	13	4	6	11	5
C	1	8	13	5	4	10	6	10	9	-1
	2	8	7	-1	10	13	3	8	12	4
D	1	10	15	5	6	11	5	5	9	4
	2	2	10	8	8	12	4	4	10	6
E	1	6	17	11	5	12	7	5	9	4
	2	5	10	5	6	13	7	11	11	0
F	1	12	16	4	7	11	4	9	9	0
	2	8	11	3	10	14	4	7	11	4
G	1	12	16	4	10	13	3	8	11	3
	2	8	11	3	10	12	2	6	11	5
H	1	12	16	4	5	12	7	8	11	3
	2	8	11	3	8	14	6	5	11	6
J	1	14	13	-1	6	12	6	6	9	3
	2	9	10	1	10	14	4	5	8	3
K	1	8	16	8	9	13	4	3	12	9
	2	9	11	2	9	13	4	6	13	7
L	1	12	16	4	9	13	4	8	12	4
	2	8	11	3	7	12	5	6	7	1

of freedom is found by interpolation; it is about 2.035. The value obtained from the accumulated data is barely one-tenth the required minimum and is obviously not significant. The null hypothesis is, therefore, accepted.

To determine intrinsic motivational effects of the different study materials, gain scores as calculated from the difference in number of correct answers must be expressed as percentages of the number of questions in the tests used for each subject. Table VII indicates the gain score percentages for each of the three types of study materials under the two motivational conditions. The total number of questions on the tests for Lessons 1 and 2 of each subject is indicated in parenthesis. (Pre-tests and post-tests had, respectively, the same number of questions.)

TABLE VII

GAIN-SCORE PERCENTAGES OF ALL STUDENTS UNDER FIXED AND VARIABLE INCENTIVE MOTIVATIONAL CONDITIONS FOR DIFFERENT STUDY MATERIALS

Subject	Variable incentive	Fixed incentive
Rules (28)* of the Road	28.3	23.0
Job (27) Descriptions	35.1	33.0
The (28) Broadcaster	23.5	22.6

*Numbers in parentheses indicate the total number of questions on pre- and post-tests combined.

As is evident from the table, the greatest difference in learning was not produced by different payment incentives, but appeared in the difference in gain scores for the subjects of "Job Descriptions" and "The Broadcaster." The largest increase in gain score for a single subject was 5.3 percent, the difference between 28.3 percent gain with the variable incentive and 23.0 percent gain with the fixed incentive for "Rules of the Road." However, comparing topics of the study materials, the greatest gain occurred under the variable incentive condition in the difference between a gain of 35.1 percent for "Job Descriptions" and 23.5 percent for "The Broadcaster." This difference was 11.6 percent.

By considering both motivational conditions together, the effects of differences in extrinsic incentive conditions are reduced to zero and the intrinsic effects of the two types of study materials can be investigated. Since all groups involved the same number of students, gain scores under the different motivational conditions can be combined by taking a simple arithmetic mean. Since all sixty-six students studied both types of materials, there are sixty-five statistical degrees of freedom; for significance at the 5 percent level, a _t_-value of 1.994 is required. The calculated _t_ in comparing these two study materials for these students is 1.98. Thus, the greatest difference in gain does not seem significant in comparison to the other study materials presented, but may be an indication of how this experiment should be interpreted.

Interpretation of Data

In a small pilot study, it had been found that students would not be available in the "free" society if they were not paid. In the larger, institutional study described here, the fixed incentive was intended to serve only as pay to students for participating in the experiment. Only the variable incentive was directly related to achievement.

The lack of significance of the differences in learning with this confined population under the two incentive conditions indicates that monetary rewards directly linked to achievement do not provide any greater incentive to stimulate students' interest in academic accomplishment than the fixed incentive fee for participation in the investigation. Several explanations may be offered to account for this evident lack of significance of the results. It may be that because the fixed incentive paid nearly the same amount to the students as the variable incentive, that students were equally motivated under the two conditions. It may be that students perceived the personal items that they could buy as in the nature of luxuries, beyond and above food, clothing, and housing provided by the institution, and that, therefore, the incentives were not very meaningful to them. The opportunity to be respected as participants in an experiment may have been perceived as personal interest in the individuals and have been reflected in greater than normal interest in the study materials, (_i_._e_., gains may have been due to the Hawthorne Effect). Finally, it may be that students were genuinely interested in the study materials provided. The fact that gains with one topic were much higher than with the other two would indicate that motivation was inherent in the study materials themselves.

Informal conversation with some of the students indicated that the extrinsic rewards were not important. Several of those who were paid the variable incentive said that they didn't pay attention to the money, but were interested in learning the subject. They volunteered remarks to the effect that they wished they had had "this kind (of instruction) on the outside." They indicated clearly both their recognition that their inability to succeed in the world was related to their inability to learn in conventional schools and their pleasure at learning with programmed instruction and teaching machines. Organization and content of the material presented apparently had greater effect on learning than rewards. This was true regardless of the type of teaching machine on which materials were presented.

The fact that the mean-gain scores for the "Job Descriptions" lessons were so much higher than for the other study materials suggests that students were more strongly motivated by subject matter which was related to readily attainable goals than by material which was related to less familiar subjects. These lessons contained a discussion of the work of a carpenter and was written as a story, in a conversational style. The lessons described conversations between a young man going to work for the first time, and an older friend who was a journeyman on the job. The conversations included definitions and examples of uses of new words, which the student had to learn. It is conceivable that many of the students would aspire to work in the construction industry. Therefore, their greater achievement with this course than with the others could be attributed to relationship of the work to their background and aspirations.

The lessons on "Rules of the Road" included a large number of references to Boston, Massachusetts, and gave specific instructions on legal requirements for a driver's license. The pilot study for the major effort of which this experiment was a part had been conducted in Boston, and when it was moved to Maryland, the study materials did not provide the same degree of intrinsic motivation. Students in the Maryland institution probably had very low expectancy of ever needing Massachusetts driver's licenses! "The Broadcaster" included instructions for connecting and adjusting electrical equipment to transmit the student's voice to a radio receiver on the other side of the room. Manipulating the equipment seemed frightening to some of the students; a few even refused to carry out the instructions in the lesson on the kit provided. Others indicated that the equipment was too complex or that it was irrelevant to their expectations. None had ever seen one in use. The style of writing on these two topics was expository, not conversational.

The inclusion of these two less than welcome subjects may actually have aided the study of the incentive conditions tried. It may be worth noting that the gain score for "Rules of the Road" was 28.3 percent with the variable incentive but only 23.0 percent with the fixed incentive. The difference is, however, not significant. These subjects have, on the other hand, thrown the motivational effect of content and writing style of study materials into sharper focus. Further studies should consider influences of variations in content and style of instructional programs. What is the difference in learning if the style is conversational from what it is with an explanatory style? What is the difference if road signs refer to the local community or to a distant one?

CHAPTER V

SUMMARY AND RECOMMENDATIONS

Summary

With the current "crisis in education" and demands for social changes, it is clear that new ways of motivating students must be found if we are going to continue to enjoy the fruits of scientific advancement. This study attempted to determine whether or not monetary payments linked to academic achievement could be used to motivate disadvantaged youth to improve in reading. The hypothesis of the study was that they could not.

About half a century ago, John Dewey proved that children learn better the studies which require them to actively participate than those to which they passively listen. As a result, many efforts to motivate children in school have tried to relate studies to daily activities, by means of art work and group interaction. Some experiments have achieved very good results by giving students tokens which could be exchanged for pleasant activities as rewards for learning. Non-graded school systems motivate students by allowing each student's progress to stimulate him as he proceeds through a course. Programmed instruction attempts to stimulate the student at each step of learning. Powerful motivation may be obtained by a logical organization which arouses a student's curiosity regarding experiences which differ from his expectations.

This study was conducted as a formal experiment, using young men from deprived environments who were inmates at a correctional institution. Although some of them had attended high school, they could read no better than a child in the fifth grade (on the California Achievement Test their grade scores were between 4.0 and 5.5). They were between sixteen and twenty-two years of age and had been sentenced for an average confinement of three years. They had had little work experience. The methodology used was to measure the learning in terms of the change in test scores between a post-test and a pre-test on each of two lessons on each of three types of study materials. Two groups of students were used, with students in one group paid a fixed fee of five dollars and the others paid at the rate of five cents per correct answer given on the tests. Data obtained from the two groups were compared by means of a *t*-test to determine whether the differences in gain scores between the two modes of motivation were significant or not.

Results of the investigation indicated that with the population involved money directly linked to achievement did not serve to motivate students to higher achievement than money paid for participation in the experiment. This could be attributed to any one or a combination of several factors. The amounts of money paid to students in the two groups were nearly the same, and students may have failed to discern the directness of the link to achievement in the second situation. Being confined inmates whose basic needs were met by the institution, students may not have valued the "luxury" items they could buy with reward money as highly as had been expected. The Hawthorne Effect of interest shown in the men may have predominated over any money rewards the men received. The study materials themselves may have been intrinsically stimulating to the students. The latter seems to have been the case, as the increase in learning with one type of study material was considerably higher than with the other two. Part of the reason for the increase in interest with "Job Descriptions" over the results obtained with the other two titles was probably because the subject matter was more directly related to activities to which the students could aspire than were the other two. Some motivation may also have been stimulated by the conversational style in which it was written.

Recommendations for Further Research

Motivation of students toward learning is an area in which much work still needs to be done.

In most confinement institutions, cigarettes serve as a medium of exchange among inmates, and it would have been interesting to evaluate their usefulness in this experiment. Effectiveness of cigarettes as motivators might be considered not only from a physiological basis, but also as one indication of sociological pressures in confinement. Another consideration would be to measure the learning when inmates were not paid for participating in the study. We already know that deprived youth in the free society will not participate without pay. A useful study might compare learning under three conditions: no pay, variable incentive pay in money, and variable incentive pay in cigarettes. If cigarettes are perceived as providing more immediate and satisfying reward to confined inmates, their use may be justified as a temporary measure to help inmates succeed in gaining marketable skills they can use after release. Inmates who do not smoke could be given candy or other rewards.

A more promising area of study is the consideration of styles of written programmed instruction and the relation of content to the students' environment. Studies should be made of expository styles of programmed study material compared to a conversational story line description of the same information. Several different topics of interest and several different populations should be considered. Learning achievement should be compared when illustrations relate to students' environment with achievement when they do not relate to students' environment or aspirations.

Recommendations for Practical Implementation

Differences in gain scores between the variable incentive and the fixed incentive motivational conditions are not significant with this confined population, and no recommendation can be made regarding the use of monetary rewards for educational achievement by these individuals. With students in the "free" society and with abnormal students they may prove useful.

The rather high improvement in gain score when study materials were related to a conceivably readily attainable goal implies that teachers and program writers should express their instruction in terms that are directly relevant to students' immediate environment and aspirations. When the goals presented are perceived as attainable in real life, students are not frustrated by an "impossible dream."

BIBLIOGRAPHY

BIBLIOGRAPHY

Boutwell, W. D. "What's Happening in Education: The Hawthorne Effect," PTA Magazine, LVIII (March, 1964), p. 14.

Campbell, D. "Best Advice I Ever Had," The Reader's Digest, LXXV (August, 1959), pp. 107-10.

Cantril, Hadley. "A Study of Aspirations," Scientific American, CCVIII (February, 1963), pp. 41-45.

Cohen, Stewart. "The Ghetto Dropout: Analysis and Partial Solution," The Clearing House, XLIV (October, 1969), pp. 118-22.

Crowder, Norman A. "On the Differences Between Linear and Intrinsic Programming," Phi Delta Kappan, XLIV (March, 1963), pp. 250-54.

Crowley, F. J. "Goals of Male High School Seniors," Personnel and Guidance Journal, XXXVII (March, 1959), pp. 488-92.

Dworkin, Martin S. Dewey on Education. Selections with an Introduction and Notes. New York: Teachers College, Columbia University, 1959.

Eysenck, H. J. "The Measurement of Motivation," Scientific American, CCVII (May, 1963), pp. 130-40.

Gardner, J. W. "Can We be Equal and Excellent Too?" (Excerpts from Excellence), The Reader's Digest, LXXIX (October, 1961), pp. 88-94.

Glasscock, E. M. "Build the Will to Work," Nation's Business, XLVIII (October, 1960), pp. 68-76.

"Golden Grades," Newsweek, LXVII (April 4, 1966), p. 62.

Guilford, J. P. Fundamental Statistics in Psychology and Education. New York: McGraw-Hill Book Company, Inc., 1950.

Hamblin, Robert L., et al. "Changing the Game from 'Get the Teacher' to 'Learn'," Trans-Action, VI (January, 1969), pp. 20-31.

Harrison, E. C. "Achievement Motivation Characteristics of Negro College Freshmen," *Personnel and Guidance Journal*, XXXVIII (October, 1959), pp. 146-49.

"How to Spur Ambition," *Science News Letter*, LXXXVI (July 4, 1964), p. 7.

Krider, M. Y. "Motivating Creativity," *School Arts*, LX (April, 1961), pp. 13-14.

Learning Activity Packages, Appendix C to Final Report. Model Secondary School for the Deaf - A Study of Instructional Methodologies. Silver Spring, Md.: Computer Applications Incorporated, Education and Training Division, 1968.

Lindquist, E. F. *Design and Analysis of Experiments in Psychology and Education*. Boston: Houghton Mifflin Company, 1953.

Martinson, W. D. and L. C. Stamatakos. "An Attempt to Motivate Potentially Superior Students," *School and Society*, LXXXVII (April 11, 1959), pp. 173-75.

McMullan, Mary. "The Key to Action," *School Arts*, LXIII (March, 1964), pp. 5-7.

Miller, Neal E. "Experiments in Motivation," *Science*, CXXVI (December 20, 1957), pp. 1271-78.

Miller, Richard I. (ed.). *Catalyst for Change: A National Study of ESEA Title III (PACE), Report to Subcommittee on Education, Committee on Labor* and Public Welfare, U. S. Senate, 90th Congress, 1st Session, on P. L. 89-10 Washington: Government Printing Office, 1967.

Moore, J. William and Wendell I. Smith. "Motivation in Automated Instruction," *School Life*, XLVI (November, 1963), pp. 21-22.

———, ———, and Richard Teevan. *Motivational Variables in Programmed Learning*. Final Report: USOE, Title VII, Grant No. 7-48-0070-149.1. Bucknell University, Lewisburg, Pennsylvania, May, 1965.

"Motivation," National Education Association Journal, XLVIII (January, 1959), pp. 12-13.

"Motivation Research Requires Review," Christian Century, LXXIV (April 3, 1957), p. 412.

Mouly, George J. The Science of Educational Research. New York: American Book Company, 1963.

Newsom, C. V. "Too Much Programmed Education," Vital Speeches of the Day, XXIV (March 1, 1958), pp. 298-300.

Pappas, Marilyn. "Motivation, New Ways of Seeing," School Arts, LXIII (September, 1963), pp 8-11.

Pearson, Ralph M. "Art Teachers and Hidden Persuasion," School Arts, LVII (May, 1958), pp. 29-31.

Premack, David. "Predicting Instrumental Performance from the Independent Rate of the Contingency Response," Journal of Experimental Psychology, LXI (1961), pp. 163-171.

Stafford, Kenneth R. and Charles F. Combs. "Radical Reductionism: A Possible Source of Inadequacy in Autoinstructional Techniques," American Psychologist, XXII (August, 1967), pp. 667-69.

The Washington Post, November, 1965.

Waetjen, Walter B. "Learning and Motivation: Implications for the Teaching of Science," The Science Teacher, (May, 1965), pp. 22-26.

Walther, Richard E. and Leigh H. Ferguson. A Pilot Study of the Use of Area of Interest Self-Instructional Reading Courses Among Young Persons Considered to be Neither Self-Motivating nor Self-Supporting. Final Report to the Office of Manpower Policy, Evaluation and Research, U. S. Department of Labor (Contract MDTA-35-64). Silver Spring, Md.: U. S. Industries, Inc., 1966.

APPENDIX

APPENDIX

Sample Tests

Typical pre-tests and post-tests used in this project are included on the following pages. All tests marked "Form A" were used as pre-tests, while those marked "Form B" were used as post-tests.

It will be noted that most multiple-choice items have only three options, where experienced test designers usually recommend four or five. The use of three options in this case was justified on the ground that the format is similar to that employed in the programmed instruction text. A greater number of options in the lessons were considered as possibly self-defeating in that students from the particular target population could easily have been discouraged from taking advantage of correctional information on wrong-answer pages. With a smaller number of choices there seemed less likelihood of frustration as a result of selecting an excessive number of incorrect answers.

RULES OF THE ROAD SURVEY

(FORM A)

(LESSON 1)

NAME ______________________________

DATE ______________________________

DO NOT TURN THIS PAGE
UNTIL YOU ARE TOLD TO DO SO.

USI U.S. INDUSTRIES, INC. EDUCATIONAL SCIENCE DIVISION
12345 NEW COLUMBIA PIKE • SILVER SPRING, MARYLAND 20910 • (301) MAYFAIR 2-1250

1. What is a license?

☐ a. A piece of paper showing that you have bought a car.
☐ b. A card showing that you have permission by law to do something.
☐ c. A card showing that you are going to take your driver's test.

2. What is a special right or favor?

☐ a. A privilege.
☐ b. A natural right.
☐ c. A permission.

3. What does qualified mean?

☐ a. To be fit to do something.
☐ b. To know again.
☐ c. To be unable to do something.

4. What does recognize mean?

☐ a. To forget to obey.
☐ b. To know again.
☐ c. To see the signs.

5. What is traffic?

☐ a. Automobiles, trucks, and buses.
☐ b. Traveling by car through a big city.
☐ c. A parking lot full of cars.
☐ d. Automobiles, trucks, buses moving along the road.

6. What is it called when there are too many people or things crowded into a narrow space?

☐ a. Regulation.
☐ b. Congestion.
☐ c. Traffic.

What is regulation?

☐ a. Violating a traffic rule.
☐ b. A special right or favor.
☐ c. Setting up rules to control traffic.

What is breaking a law called?

☐ a. Recognizing a law.
☐ b. Violating a law.
☐ c. Voicing a law.

How should you think of your driver's license?

☐ a. As a constitutional right.
☐ b. As a privilege.
☐ c. As a natural right.

10. Who gives you the right to drive an automobile?

☐ a. The local police.
☐ b. The Federal Government.
☐ c. The State of Massachusetts.

11. You must do several things before you can get your driver's license. In which group below are all these things listed?

☐ a. Take an eye test.
Answer written questions on driving.
Drive a car over a test road.

☐ b. Take an eye test.
Name the parts of a car.
Answer written questions on driving.

☐ c. Take an eye test.
Drive a car over a test road.
Drive for a month without an accident.

12. Who has the legal right to have a driver's license?

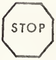
☐ a. Only those who have taken a driver's training course.
☐ b. Only those who have passed the driving tests.
☐ c. Anybody over 18.

Pick the answer that tells you what you should do when you see each of the following signs.

13.

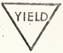
☐ a. Increase your speed so you are driving at least 35 MPH.
☐ b. Make sure you are not driving over 35 MPH.
☐ c. Slow down when you see the sign.

14.



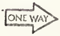
☐ a. Look both ways.
☐ b. Stop and look both ways.
☐ c. Slow down a little and look both ways.

15.



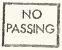
☐ a. Look for other cars.
☐ b. Signal for a stop.
☐ c. Signal for a turn.

16.



☐ a. Turn left.
☐ b. Drive on one side of the street.
☐ c. Turn right.

17.



☐ a. Don't pass at any time.
☐ b. Don't pass unless you can see ahead of you.
☐ c. Don't pass unless you have to.

RULES OF THE ROAD SURVEY

(FORM B)

(LESSON 1)

NAME

DATE

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D-504-3(8)

1. A card or paper showing permission to do something by law is called __________.

☐ a. a label
☐ b. a license
☐ c. a liberal

2. What is a privilege?

☐ a. A special right or favor.
☐ b. A natural right.
☐ c. Something you should do.

3. To be fit to do something means you are __________.

☐ a. qualified
☐ b. equalized
☐ c. recognized

4. To know again means to __________.

☐ a. see again
☐ b. recognize
☐ c. refuse

5. The movement of automobiles, trucks, and buses along the road is called __________.

☐ a. vehicles
☐ b. regulation
☐ c. parking
☐ d. traffic

6. What is congestion?

☐ a. Automobiles, trucks, and buses.
☐ b. Too many things or people crowded into a narrow space.
☐ c. A crowd.

7. Setting up rules to control traffic is called __________.

☐ a. relation
☐ b. violation
☐ c. regulation

8. Violating the law means __________.

☐ a. recognizing a law
☐ b. breaking the law
☐ c. using a law

9. Which of these would you consider a privilege?

☐ a. The right to think.
☐ b. The right to have a driver's license.
☐ c. The right to breathe.

10. What privilege does the State of Massachusetts grant you?

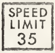
11. [illegible] you were to take the following test: an eye test, a written test, and a driving test?

☐ a. A license to drive a car.
☐ b. A license to buy a car.
☐ c. A license to repair a car.

12. Which of these people would have a legal right to drive a car on the highways?

☐ a. John, who is 18 and knows how to drive.
☐ b. Bill, who has passed both driving tests.
☐ c. Jim, who can name all the parts of a car.

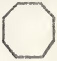
13. You are driving along the road at 50 miles per hour and see this sign:



You continue driving at 50 miles per hour. What kind of sign did you disobey?

☐ a. A warning sign.
☐ b. A speed-limit sign.
☐ c. A road marker.

14. You are driving along and come to an intersection where there is a sign shaped like this:

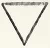


You go right across the intersection without slowing down.

What kind of sign did you disobey?

☐ a. A warning sign.
☐ b. A stop sign.
☐ c. A speed-limit sign.

15. You come to an intersection where there is a sign shaped like this:



What are you supposed to do?

☐ a. Look for other cars.
☐ b. Stop.
☐ c. Signal for a turn.

16. You make a turn and suddenly you find yourself faced with two lanes of traffic, both heading toward you. What kind of sign did you disobey?

☐ a. A no-passing sign.
☐ b. A no-left-turn sign.
☐ c. A one-way sign.

17. You're driving behind a car that is going slowly, and you want to pass. Then you notice a sign on the side of the road and two solid parallel lines in the center of the road. What do they mean?

☐ a. Don't pass.
☐ b. Pass with care.

RULES OF THE ROAD SURVEY

(FORM A)

(LESSON 2)

NAME ______________________________

DATE ______________________

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1. A potential danger is a danger that __________.

☐ a. may exist under certain conditions
☐ b. does not exist at all
☐ c. will never happen

2. Being very careful means using __________.

☐ a. your eyes
☐ b. caution
☐ c. your brake

What is a hazard?

☐ a. A chance of loss or harm.
☐ b. Something nice that happens.
☐ c. Permission to do something.

To continue on after having stopped means to __________.

☐ a. procedure
☐ b. proceed
☐ c. process

What is equipment?

☐ a. Objects a person does not use.
☐ b. Things that a person cannot do.
☐ c. Supplies a person needs to do a job.

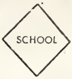
What is a marker?

☐ a. A warning sign.
☐ b. An informational sign.
☐ c. A regulatory sign.

What is a pedestrian?

☐ a. A person on foot.
☐ b. A person in a vehicle.
☐ c. A person riding a bicycle.

8. Suppose you were driving along and you saw this sign: What should you do?

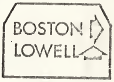


☐ a. Continue at the same speed unless there are children on the sidewalk.
☐ b. Come to a complete stop and then continue at the same speed.
☐ c. Slow down and proceed with caution until you leave the school zone.

9. Suppose you were driving along and you saw a diamond-shaped sign. What kind of sign would it be?

☐ a. A warning sign.
☐ b. An informational sign.
☐ c. A regulatory sign.

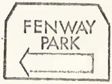
10. You are in your car on your way to Boston. You come to an intersection and see the following marker:



Which way should you go from here?

☐ a. Turn right.
☐ b. Turn left.
☐ c. Drive straight ahead.

11. Suppose you are driving north along Route C28 and you suddenly decided you wanted to go to Fenway Park. You see this marker:



Which way does it tell you to go from here?

☐ a. Turn left, then take the next right.
☐ b. Turn left.
☐ c. Go straight ahead.

RULES OF THE ROAD SURVEY

(FORM B)

(LESSON 2)

NAME

DATE

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1. A danger that may exist under certain conditions is a __________ danger.

☐ a. potential
☐ b. superstitious
☐ c. violation

2. Using caution means __________.

☐ a. using your eyes
☐ b. being very careful
☐ c. putting on your brakes

3. A chance of loss or harm is __________.

☐ a. a hazard
☐ b. a hope
☐ c. an opportunity

4. To proceed means __________.

☐ a. to do something in a certain way
☐ b. to go on after stopping
☐ c. to make sure something is right

5. Furnishings or supplies necessary to do a job are called __________.

☐ a. hazards
☐ b. tools
☐ c. equipment

6. Informational signs are usually called

__________.

☐ a. notices
☐ b. markers
☐ c. flags

7. A person walking is called a __________.

☐ a. pedestrian
☐ b. pediatrician
☐ c. pedestal

8. Warning signs usually tell you to __________.

☐ a. stop
☐ b. change gears
☐ c. proceed with caution

9. What shape do warning signs usually have?

☐ a. Diamond.
☐ b. Round.
☐ c. Triangular.

10. If a road marker has a directional arrow pointing straight up, what do you do?

☐ a. Go straight ahead.
☐ b. Stop, then go straight ahead.
☐ c. Go straight ahead, then turn right.

11. If a road marker has an arrow pointing in this direction, what do you do?

☐ a. Turn right.
☐ b. Turn left.
☐ c. Proceed with caution.

JOB DESCRIPTIONS SURVEY

(FORM B)

(LESSON 2)

NAME ______________________________

DATE ____________________

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D-504-4(B)
5-65

1. When you are stopped or held back, which of the following is done?

☐ a. You are unrestrained.
☐ b. You are restricted.
☐ c. You are returned.

What is a natural ability?

☐ a. Altitude.
☐ b. Aptitude.
☐ c. Obese.

What does inclement weather mean?

☐ a. Good weather.
☐ b. Bad weather.
☐ c. Weather that is changing.

Which of the following is a skilled worker?

☐ a. Apprentice.
☐ b. Journeyman.
☐ c. Trainee.

Work that is done only during certain times of the year is which of the following?

☐ a. Inclement.
☐ b. Annual.
☐ c. Seasonal.

What is a requirement?

☐ a. Something needed or necessary.
☐ b. What a plumber can do at age 65.
☐ c. Something that a plumber uses in his work.

What is overtime work?

☐ a. Work done during a normal work day.
☐ b. Work done beyond the normal hours.
☐ c. Work an apprentice does not do.

Which of the following is an example of a telephone's being installed?

☐ a. Cutting the wires of a telephone so it won't ring.
☐ b. Moving the phone to another room and not connecting it.
☐ c. Connecting a new telephone to the wires on the outside.

9. What happens to an apprentice plumber after five years of training?

☐ a. He is half-way through his apprentice training period.
☐ b. He has already been a journeyman plumber for two years.
☐ c. He finishes his training and becomes a journeyman plumber.

10. If a journeyman plumber is paid $4.00 an hour, how much does a beginning apprentice get?

☐ a. $1.25 an hour.
☐ b. $2.00 an hour.
☐ c. $2.50 an hour.
☐ d. $3.00 an hour.

11. One man is 25 years old, and the other is 26 years old. Which of them is qualified to become an apprentice plumber or are they both qualified?

☐ a. The one who is 25 years old is qualified.
☐ b. The one who is 26 years old is qualified.
☐ c. Both are qualified.

12. A man is not a high school graduate. Can he become a plumber?

☐ a. Yes, if he goes to trade school first.
☐ b. Yes, if he is between the ages of 16 and 25.
☐ c. Yes, if he finishes high school first and is between the ages of 18 and 26.

13. A plumber works 8 hours a day, 5 days a week. What is he doing?

☐ a. He is working a normal work week.
☐ b. He is working overtime.
☐ c. He is working 3 hours less than he should.

14. What is one advantage plumbers have over baseball players?

☐ a. Their work is seasonal.
☐ b. Most of their work is done outside.
☐ c. They can work during inclement weather.

THE BROADCASTER SURVEY

(FORM A)

(LESSON 1)

NAME ____________________

DATE ____________________

DO NOT TURN THIS PAGE
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1. If a substance is called a conductor, what is it?
   - ☐ a. Material that electricity can flow through.
   - ☐ b. Material that keeps wires apart.
   - ☐ c. Material that stops electric flow.

2. Which of the parts below is external to the Broadcaster?
   - ☐ a. The screws on the fiberboard.
   - ☐ b. The fiberboard.
   - ☐ c. The microphone.

3. What is something that increases the volume of sound?
   - ☐ a. An amplifier.
   - ☐ b. An activator.
   - ☐ c. A radio.

4. When something is internal, where is it?
   - ☐ a. Opposite something else.
   - ☐ b. Outside something else.
   - ☐ c. Within something else.

5. What is insulation?
   - ☐ a. Material that covers and protects wire.
   - ☐ b. Material that makes electricity.
   - ☐ c. Material that makes electricity flow better.

6. When the Broadcaster makes a sound louder, what does it do?
   - ☐ a. It activates the sound.
   - ☐ b. It amplifies the sound.
   - ☐ c. It transmits the sound.

7. What is a procedure?
   - ☐ a. A tool you use.
   - ☐ b. A place you begin.
   - ☐ c. A plan you follow.

8. Which set of parts must you have to use the Broadcaster as an amplifier?

a. Microphone, radio receiver, speaker.
b. Wire, microphone, speaker.
c. Antenna, radio receiver, record turntable.

9. In what procedure is this a step?

Connect the microphone plug to the jack
marked LOW on the Broadcaster.

☐ a. The procedure of connecting the parts of a Hi-Fi set.
☐ b. The procedure of setting up the Broadcaster as an amplifier.
☐ c. The procedure of setting up the Broadcaster as a record player.

10. If a man is using the Broadcaster with a microphone and a speaker, how is he using it?

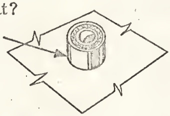
☐ a. As a transmitter.
☐ b. As an amplifier.
☐ c. As a radio.

11. When you use the Broadcaster as an amplifier, what is the first step you take when you want to set the volume?

☐ a. Set the switch.
☐ b. Plug in the Broadcaster.
☐ c. Adjust the microphone and volume control.

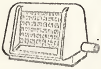
12. What does the arrow point at?

☐ a. A jack.
☐ b. A plug.
☐ c. A terminal.



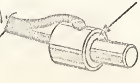
13. What is shown in the picture?

☐ a. A microphon.
☐ b. A microphone.
☐ c. A micron.



14. What does the arrow point at?

☐ a. ~~A barrel.~~ Insulation.
☐ b. ~~A pin.~~ A sleeve.
☐ c. ~~A sleeve.~~ A pin.



THE BROADCASTER SURVEY

(FORM B)

(LESSON 1)

____
NAME

____
DATE

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1. Which of the substances below is a conductor?
   - ☐ a. A copper wire that electricity passes through.
   - ☐ b. The rubber that covers and protects wire.
   - ☐ c. Plastic that electricity doesn't pass through.

2. When something is external, where is it?
   - ☐ a. Opposite something else.
   - ☐ b. Outside something else.
   - ☐ c. Within something else.

3. What is an amplifier?
   - ☐ a. A device that turns on a record player.
   - ☐ b. A device that tunes in a radio station.
   - ☐ c. A device that increases the volume of sound.

4. Which of the following items is an internal part of an electric clock?
   - ☐ a. An electric cord.
   - ☐ b. An electric motor.
   - ☐ c. A plug.

5. Which of the items below acts as insulation?
   - ☐ a. The rubber around a wire.
   - ☐ b. The plug on the end of a wire.
   - ☐ c. The connection between two wires.

6. If something amplifies something else, what does it do to it?
   - ☐ a. It makes it longer.
   - ☐ b. It makes it louder.
   - ☐ c. It makes it lower.

7. What is another word for a plan or method?
   - ☐ a. Production.
   - ☐ b. Precedence.
   - ☐ c. Procedure.

8. If you have a Broadcaster, some wire, a speaker, and a microphone, how ca
you use the Broadcaster?

☐ a. As a radio.
☐ b. As a transmitter.
☐ c. As an amplifier.

9. When you want to use the Broadcaster as an amplifier, what is one step you take in connecting the external parts?

☐ a. You turn on the flashlight.
☐ b. You connect the wire to the speaker.
☐ c. You set the switch to AMPLIFY.

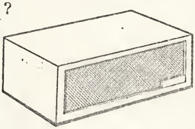
10. If you want to use a Broadcaster to amplify your voice, what external parts do you need?

☐ a. Microphone, radio, speaker.
☐ b. Microphone, speaker, wire.
☐ c. Antenna, microphone, radio receiver.

11. When you are using the Broadcaster as an amplifier, what is one step you take when you are setting the volume?

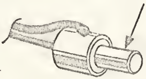
☐ a. Connect the microphone to the jack marked LOW.
☐ b. Connect the wire to the speaker.
☐ c. Adjust the volume control.

12. What is shown in the picture?



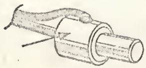
☐ a. Speak.
☐ b. Speaker.
☐ c. Speeker.

13. What does the arrow point at?



☐ a. ~~A plug.~~ The pin.
☐ b. ~~A terminal.~~ A jack.
☐ c. ~~A jack.~~ A terminal.

14. What does the arrow point at?



☐ a. Barrel.
☐ b. Pin.
☐ c. Insulation.

THE BROADCASTER SURVEY

(FORM A)

(LESSON 2)

NAME ______________________________

DATE ____________________

DO NOT TURN THIS PAGE
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1. What is an antenna?
   - ☐ a. An instrument that sends out and picks up radio signals from space.
   - ☐ b. An instrument that is called the anterior post of a radio.
   - ☐ c. An instrument that picks up and sends out telephone signals along a wire.

2. What do you call the part of an instrument that has a scale and a pointer?
   - ☐ a. A deal.
   - ☐ b. A ruler.
   - ☐ c. A dial.

3. If we say that a button on one machine has something in common with a button on another machine, what do we mean?
   - ☐ a. They correspond.
   - ☐ b. They are exactly opposite.
   - ☐ c. They are different.

4. What is a radio component?
   - ☐ a. Someone who announces sports news.
   - ☐ b. Any part of a radio.
   - ☐ c. The name of a radio station.

5. What do you call something that sends out signals to an antenna?
   - ☐ a. A transmission.
   - ☐ b. A receiver.
   - ☐ c. A transmitter.

6. What is a receiver?
   - ☐ a. A large loudspeaker.
   - ☐ b. A radio that picks up signals.
   - ☐ c. A telegraph key.

7. Which set of parts must you have to use the Broadcaster as a radio station?
   - ☐ a. Earphones, microphone, radar antenna.
   - ☐ b. Microphone, radio receiver, speaker.
   - ☐ c. Microphone, radio receiver, coil of wire.

8. Which is the first step you would take to set up the Broadcaster for use as a radio station?

   ☐ a. Connect the microphone plug to the jack marked LOW.

   ☐ b. Put a radio receiver 20 feet from the Broadcaster and tune the dial to the right place.

   ☐ c. Set up the antenna.

9. If you saw someone using the Broadcaster with a microphone and a speaker, how would he be using it?

   ☐ a. As a radio station.

   ☐ b. As a sending set.

   ☐ c. As an amplifier.

10. What is the first step in tuning the Broadcaster when you are using it as a radio station?

   ☐ a. Turn the volume control all the way to the right and set the switch to AMPLIFY.

   ☐ b. Turn the adjusting screw all the way to the left.

   ☐ c. Turn the adjusting screw to the left until the Broadcaster is tuned to the radio.

11. How is a radio connected to the Broadcaster?

   ☐ a. By wire.

   ☐ b. By jack and plug.

   ☐ c. The radio is not connected to the Broadcaster.

12. When you're using the Broadcaster as a radio station, how far away should you put the radio receiver?

   ☐ a. 3 feet.

   ☐ b. 11 feet.

   ☐ c. 20 feet.

13. How far away from your mouth should you hold the microphone when you are talking into it?

   ☐ a. 3 feet.

   ☐ b. 4 inches.

   ☐ c. 40 feet.

14. Which of the following should you plug into the wall before using the Broadcaster as an amplifier?

☐ a. The Broadcaster.
☐ b. The speaker.
☐ c. The microphone.

THE BROADCASTER SURVEY

(FORM B)

(LESSON 2)

NAME ____________________

DATE ____________________

DO NOT TURN THIS PAGE
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1. What do you call an instrument that sends out and picks up radio signals from space?

   ☐ a. An antenna.
   ☐ b. An amplifier.
   ☐ c. A transmitter.

2. What is a dial?

   ☐ a. A kind of ruler.
   ☐ b. An answer on the telephone.
   ☐ c. A scale and a pointer.

3. If someone says that a button on one machine corresponds to a knob on another machine, what does he mean?

   ☐ a. The buttons have something in common.
   ☐ b. The buttons write to each other.
   ☐ c. The buttons are exactly opposite.

4. What is a name given to any part of a radio?

   ☐ a. A combination.
   ☐ b. A component.
   ☐ c. A transmitter.

5. What is a transmitter?

   ☐ a. A radio set that you listen to.
   ☐ b. A telephone that picks up a signal from a wire.
   ☐ c. A radio that sends out signals.

6. What do you call something that picks up signals from an antenna?

   ☐ a. A receiver.
   ☐ b. A transmitter.
   ☐ c. A recorder.

7. If you had a Broadcaster, a microphone, and a radio receiver, how could you use the Broadcaster?

   ☐ a. As an amplifier.
   ☐ b. As a radio station.
   ☐ c. As a telegraph key.

8. When you position a radio receiver about 20 feet from the Broadcaster and tune the dial to a point where no other station can be heard, what have you done?

☐a. I have taken the first step in setting up the Broadcaster as an amplifier.

☐b. I have taken the first step in setting up the Broadcaster as a radio station.

☐c. I have taken the last step in setting up the Broadcaster as a radio station.

9. In what two ways can a Broadcaster be used?

☐a. As a radio and as a dial.

☐b. As an amplifier and as a telegraph key.

☐c. As an amplifier and as a radio station.

10. When you are setting up the Broadcaster as a radio station, where do you set the switch?

☐a. At BROADCAST.

☐b. At AMPLIFY.

☐c. At OFF.

11. In which step in the procedure is a radio connected to the Broadcaster?

☐a. In the first step of the setting-up part.

☐b. In the last step of the tuning-in part.

☐c. The radio is not connected to the Broadcaster.

12. When using the Broadcaster as a radio station, which of these should you put 20 feet away from it?

☐a. The microphone.

☐b. The radio receiver.

☐c. The speaker.

13. When using the Broadcaster as an amplifier, which of these should you hold about 4 inches away from your mouth?

☐a. The microphone.

☐b. The radio receiver.

☐c. The wall plug.

14. What should you do with the Broadcaster before using it as an amplifier?

☐a. Connect it to the radio receiver.

☐b. Turn it off.

☐ Plug it into the wall